

Having, thus, described the invention, what is claimed is:

1        1. An apparatus for placing a circular end cap on a cylindrical workpiece, comprising:

2            a stationary support base;

3            a guide member which is fixedly attached to the stationary support base and which

4            comprises a ramp;

5            a movable push bar;

6            a spacer which is operatively attached to said push bar for concurrent movement

7            therewith;

8            an emplacement applicator, comprising:

9            a back plate, having an upper part and a lower part having a post operatively  
10            attached thereto, said post being disposed proximate said ramp;

11            a flange affixed to the lower part of said applicator back plate, said flange  
12            being pivotally attached to said spacer at a pivot connection;

13            said emplacement applicator further comprising an end cap clamping jig operatively  
14            attached to the upper part of said applicator plate;

15            wherein linear inward movement of said push bar, from a first position to a second  
16            position, moves the post up the ramp, causing said applicator plate to pivotally move around  
17            said pivot connection, from a substantially horizontal orientation to a substantially vertical  
18            orientation thereof.

1        2. The apparatus of claim 1, wherein said end cap gripping jig comprises a plurality of

2 arcuate segments which cooperate to form a circular hollow therebetween, when placed in  
3 end-to-end contact with one another;  
4 wherein each of said arcuate segments is radially reciprocally movable with respect to  
5 said circular hollow.

1 3. The apparatus of claim 2, wherein each of said arcuate segments has a groove  
2 formed in an inner surface thereof, to receive an end cap edge portion.

1 4. The apparatus of claim 2, wherein said arcuate segments are provided with tapered  
2 inner edges, for forcing a circumferential edge of a workpiece inwardly as the segments are  
3 forced therewith.

1 5. The apparatus of claim 2, wherein said end cap clamping jig comprises at least  
2 three segments.

1 6. The apparatus of claim 1, further comprising a servo motor for moving said push  
2 bar.

1 7. The apparatus of claim 1, wherein said guide member comprises a first upstanding  
2 guide plate, attached to the stationary support member and having a first guide groove  
3 formed therein.

1 8. The apparatus of claim 7, wherein said first guide groove comprises a substantially

2 horizontal first section, a second section which extends upwardly at an angle from said first  
3 section and which defines said ramp therebelow, and a substantially horizontal third section.

1 9. The apparatus of claim 7, wherein said guide member comprises a second  
2 upstanding guide plate, attached to the stationary support member and having a second guide  
3 groove formed therein and facing toward the first guide groove.

1 10. The apparatus of claim 1, wherein said emplacement applicator comprises a drive  
2 plate for connecting to said push bar, and wherein said spacer is affixed to said drive plate.

1 11. The apparatus of claim 1, wherein said gripping jig is adapted to be  
2 pneumatically actuated.

1 12. The apparatus of claim 6, further comprising a threaded shaft attached to said  
2 servo motor, and wherein said push bar is threadably connected to said threaded shaft for  
3 movement thereby.

1 13. An end cap installation station, comprising a first placement apparatus which is  
2 the apparatus of claim 1, the first placement apparatus constructed and arranged to have a  
3 push bar thereof move in a first direction during placement of an end cap on a workpiece;  
4 said end cap installation station further comprising a second placement apparatus  
5 which is substantially identical to the first placement apparatus and oriented to substantially  
6 mirror said first placement apparatus,

7                   wherein said first and second placement apparatus share a common stationary support  
8                   member, and wherein said second placement apparatus is configured, constructed and  
9                   arranged to have a push bar thereof move in a second direction during placement of an end  
10                  cap on a workpiece,  
11                   wherein said second direction is substantially opposite said first direction.

1                   14. A method of applying an end cap to a cylindrical filter element having a  
2                   longitudinal axis, comprising the steps of:  
3                   a) supporting a cylindrical filter element at a central portion thereof;  
4                   b) grasping a first end cap with a clamping jig of a first end cap application apparatus,  
5                   said application apparatus comprising a back plate;  
6                   c) positioning the filter element adjacent said end cap application apparatus; and  
7                   d) pivotally moving said applicator back plate around a pivot connection, causing said  
8                   plate to move from a substantially horizontal orientation to a substantially vertical orientation  
9                   thereof, to force said end cap in covering relation over a first end of said filter element.

1                   15. The method of claim 14, further comprising a step of applying a second end cap to  
2                   a second end of said filter element with a second end cap application apparatus which is  
3                   substantially similar to said first end cap application apparatus.

1                   16. The method of claim 15, wherein both end caps are simultaneously applied to said  
2                   filter element.

1        17. The method of claim 14, wherein each of the arcuate segments of the end cap  
2        clamping member comprises a tapered edge on an inner surface thereof, and wherein said  
3        tapered edge forces a circumferential outer edge of a filter element inwardly during step d) as  
4        said tapered edge is moved past said filter element outer edge.

1        18. The method of claim 14, wherein said end cap applicator apparatus comprises a  
2        flange attached to a lower part of said back plate and a cam follower bearing attached to said  
3        flange and extending outwardly thereon, and wherein said cam follower bearing is moved up  
4        a ramp during step d).